Status of the EVM-RCN project

S. Pavlon, K. Sumorok, I. Suzuki

Fermi National Accelerator Laboratory, USA

Massachusetts Institute of Technology, USA

2001/02/15 DAQ Weekly Mtg.

The past...

- Preliminary design of the protocol
- Implementation on Linux
  - not all functionalities were implemented
- Benchmark tests on Ethernet UDP/IP
  - http://home.fnal.gov/~ichiro/presentation/chep2000/main.pdf
  - satisfied required bandwidth and latency
  - Problem: long tail of the latency distribution

Now...

- IEEE1394 asynchronous transmission is available. (Isochronous is not yet.)
- The protocol specification document is revised.
- New reliable broadcast library
  - Design document is put on the Web.
  - The library is implemented in C++
  - Modular design, capable to use both Ethernet and IEEE1394
- Preliminary benchmark tests are done.

Protocol specification

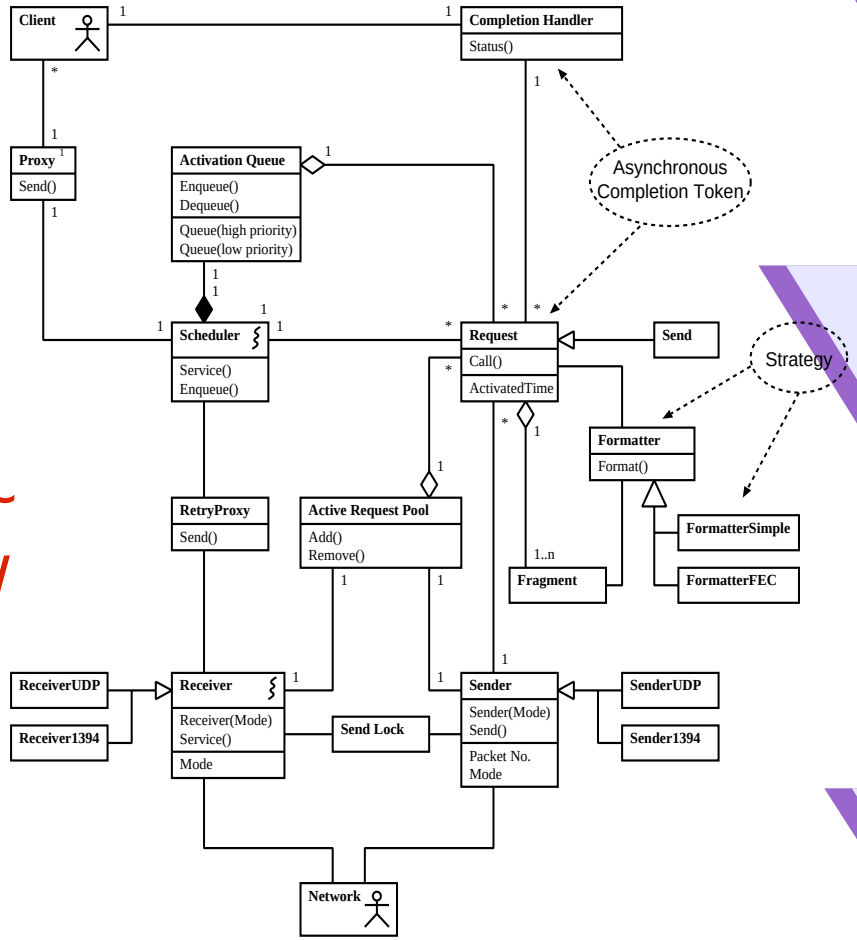
- EVM broadcasts trigger-EvtID association to the RUs
- Small latency is required due to small front-end buffer depth
- NACK based, FEC, ACK for congestion control
- http://home.fnal.gov/~ichiro/document/evm−rcn/main.ps

IEEE1394 on Linux

- Plan: use isochronous (fixed and prearranged bandwidth) packets to broadcast trigger information and use asynchronous packets to report packet losses or errors.
- Special asynchronous transfer (limited to 512bytes) is supported by the Linux driver and works on the test bench (Nov.2000 TriDAS)
- Isochronous transfer is not working on our system at this moment. Investigations are going on.

Reliable broadcast library

- Modular, flexible, simple to use
- Tried to apply object-oriented development scheme
- http://home.fnal.gov/~ichiro/document/rcnp/main.ps



Functionality test of the library

- Dummy EVM and RU using the library
- 1-to-1 configuration
- Ethernet UDP/IP: 5.6MB/s
  (Ethernet: 12.5MB/s, UDP/IP: 11MB/s,
  old benchmark: 7MB/s)
- IEEE1394: 3.4MB/s

The future...

- Benchmark tests under various conditions
  - Parameters: # of RUs, Error rate, Ether/1394
  - Non-poisson error probability (C.Fetzer, 1999)
- IEEE1394 bandwidth
  - Isochronous transmission
  - Modification of the Linux driver
- Integration to the test bench (or XDAQ)
  - Modification of the EVM and the RU code